

DOCUMENT RESUME

ED 181 521

CS 502 797

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 TITLE The Effect of Expression Sequence and Expressor Identity on Judgments of the Intensity of Facial Expression.
 PUB DATE Sep 79
 NOTE 17p.; Paper presented at the Annual Meeting of the American Psychological Association (87th, New York, NY, September 1-5, 1979)
 EDRS PRICE MF01/PC01 Plus Postage.
 DESCRIPTORS Body Language; College Students; *Communication (Thought Transfer); Emotional Response; Females; *Nonverbal Communication; *Psychological Patterns; Research
 IDENTIFIERS *Communication Research

ABSTRACT

Three hundred female college students participated in a study to determine whether viewing a prior sequence of photographs of emotional-facial expressions would influence their impressions of later expressions. Each subject was tested individually and shown one series of five separate photographs of varying facial expressions, one photograph at a time, and asked to freely label each expression shown and to rate the intensity of the expression on an 11-point scale ranging from "very weak" to "very strong." Eight of the sequences shown to subjects ended with a sad expression and ten sequences ended with a happy expression. Results showed that intensity ratings of both sad and happy final expressions were enhanced when preceded by a sequence of contrasting as opposed to similar or identical facial expressions. (FL)

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**The Effect of Expression Sequence and Expressor Identity on
Judgments of the Intensity of Facial Expression**

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Paper presented at the meeting of the American Psychological Association,
New York, September 1979. (As part of the symposium, "The Meaning of Nonverbal
Communication".)

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Abstract

The Effect of Expression Sequence and Expressor Identity on Judgments of the Intensity of Facial Expression

Subjects were exposed to a sequence of facial expression photographs to determine whether viewing earlier expressions in a sequence would alter intensity judgments of a final expression in the sequence. Results showed that whether the preceding expressions were shown by the same person who displayed the final expression, or different people, intensity ratings of both sad and happy final expressions were enhanced when preceded by a sequence of contrasting as opposed to similar or identical facial expressions. Results are discussed from the perspective of adaptation-level theory.

Our judgment of how a person is feeling depends upon what kind of facial expression he has on and how strong or intense that expression looks. So for example, a person who is smiling weakly looks happy, but not very happy, and a person with a full, open-mouth smile also looks happy, but because of the intensity, perhaps even euphoric. Obviously the perceived intensity of a facial expression is a critical factor that influences the labels we assign to, and the kinds of inferences that we make about another's internal, emotional state (e.g., Ekman, Friesen, and Ellsworth, 1972).

But what controls the perception of intensity? Is it simply dependent upon the arrangement or displacement of facial musculature, or does it also depend upon factors unrelated to the physical properties of the facial expression itself? Part of the answer to this question comes from research which shows that information about the larger social situation in which an expression is produced can modify the attribution of emotion that is based on facial expression alone (e.g., Frijda, 1968; Watson, 1972).

One virtually unexplored contextual cue that can also influence the interpretation of emotion, and especially the apparent intensity of an expression, is the information provided by a sequence of emotional displays. Just as the social situation in which an emotional display occurs can modify a judge's interpretation of emotion, it is possible that the sequence of emotional displays seen by a judge can influence his interpretation of a particular emotional expression.

Although intuitively one might expect that the sequence in which an emotional expression is embedded would be an important determinant of the meaning attributed to that particular expression, with rare exception (e.g., Thayer, in press) examination of this phenomenon has remained largely in the realm of conjecture. One of the few references to sequence or context effects
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in the literature on person perception was an early speculation by Bruner and

Tagiuri (1954) which made the point that

An important cue for judging emotion is knowledge of the baseline state of expression preceding the emotional expression being judged. We should like to suggest that this is still another instance of constraint by context.... A smiling face following a grimacing one represents one cue sequence.... a smiling face following a rather calm, expressionless one is quite another kind of cue (Bruner and Tagiuri, 1954, p. 637).

The present experiment sought to examine how viewing a prior sequence of emotional-facial expressions influences judges' impressions of later expressions. To determine how the level of contrast between the emotional qualities of a prior sequence and a final expression would influence intensity ratings of the final expression, three levels of contrast between the prior sequence and the final expression were included. In one contrast condition, the prior sequence of emotional expressions included only expressions that were similar or identical to the final expression — there was no contrast between the final expression and the prior sequence (i.e., a final happy expression preceded by a series of happy expressions or a final sad expression preceded by a series of sad expressions). In a second contrast condition the prior sequence of facial expressions included only expressions that contrasted strongly with the final expression (i.e., a final happy expression preceded by a series of sad expressions or a final sad expression preceded by a series of happy expressions). In a third contrast condition the prior sequence of facial expressions contrasted moderately, in a cumulative way, with the final expression (i.e., a final happy expression preceded by a mixed sequence of sad and surprised expressions or a final sad expression preceded by a mixed sequence of

happy and surprised expressions).

It was predicted that the stronger the contrast in emotional quality between the prior sequence and the final expression, the more intense the final expression would appear to be. To determine whether the predicted contrast or intensity-enhancing effect would occur for different facial expressions, two different final expressions were used, happy and sad.

To assess whether and how intensity ratings of a final expression in a sequence would be influenced according to the identity of the individuals showing the expressions in the prior sequence, two different types of sequence were studied in which the identity of the individuals in the prior sequence was varied. In one, the expressions in the prior sequence were shown by the same person who showed the final, critical expression. A recent study has shown that a final expression is enhanced in intensity when the same person shows a prior sequence of highly contrasting expressions (Thayer, in press). In the other identity sequence, the individual who showed the final expression was not one of the people shown in the prior sequence.

It was predicted that intensity ratings of a final expression would be higher, especially for strongly contrasting sequences, when the same individual was shown displaying all of the expressions in the sequence. This prediction was based on the assumption that judgments of the individual showing the final expression would be more influenced by seeing her display contrasting prior expressions than by seeing prior contrasting expressions shown by others. Behind this assumption is a further assumption that the more we see of a particular individual's expressive behavior, the more this experience serves as a frame of reference for judgments of later emotionally-expressive behavior.

Basically then, it was expected that judgments of the intensity of an expression would be enhanced or increased when preceded by a sequence of

contrasting expressions as opposed to a sequence of similar or identical expressions. This prediction draws upon adaptation-level theory (Helson, 1964) which posits that prior experience creates an adaptation level, frame of reference, or judgmental anchor against which later experiences are judged by comparison so that the greater the discrepancy between earlier and later elements in a sequence, the more intense the characteristics of the later elements appear to be. More generally, this research presumes that the meaning of a nonverbal, emotional display may be influenced by the context or sequence of expressive displays — a point that is at the very heart of analyzing the meaning of both verbal and nonverbal communication (e.g., Schefflen).

Method

Subjects

The subjects were 300 white, female CCNY college student volunteers, ranging in age from 18 to 31, with a mean age of 21 years 2 months.

Procedure

Each subject was tested individually and shown one series of five separate photographs of facial expression. The same individual, a woman in her forties, was shown in each final expression photograph. The two final, critical expression photographs, depicting different emotions, were taken from Ekman and Friesen (1975) because they portray unambiguous and intense facial expressions without affect blends — Happy (H) Number 36, and Sad (S) Number 37.

Each subject was shown only one of the expression sequences, one photograph at a time, and asked (a) to freely label the expression shown in each photograph (as a check that the subject was attending to the expression and identifying it correctly), and (b) to rate the intensity of the expression shown in each photograph on an 11-point scale ranging from "very weak" to "very strong". Each of the five expressions in a sequence was shown for approximately 15 seconds.

Table 1 describes the 18 experimental conditions or sequences. Eight sequences ended with a sad expression and 10 sequences ended with a happy expression.

Insert Table 1 about here

For example, in sequences 2 and 3 the same woman was shown in the first four photographs with alternating happy and surprised expressions before she showed the final sad expression. In sequences 6 and 7 four different people were shown, each displaying a happy expression before the target woman showed the final sad expression. In all of these end-in-sad sequences the same woman always displayed the same sad expression in the final photograph. In the sequences which ended with a happy expression, the same woman was shown in all final photographs.

Results and Discussion

Results of the analysis of variance for sequences ending with a happy expression and sequences ending with a sad expression showed that both analyses were significant at better than the .01 level. Table 2 shows the means and standard deviations of the eight sequences that ended with a sad expression and the 10 sequences that ended with a happy expression. Table 3 shows Duncan's test results of significant differences between sequences.

Insert Tables 2 and 3 about here

Intensity ratings of both sad and happy final expressions were enhanced when preceded by a sequence of contrasting expressions. Although this result did not reach significance for every relevant comparison, for sequences that ended with a happy expression, in eight of the nine comparisons there was either a consistent trend to give higher ratings, or significantly higher ratings were actually given to final happy expressions preceded by highly contrasting sequences. This outcome was also true for the sequences that ended with a sad

expression, where the final sad expression was rated significantly higher in all three relevant comparisons when preceded by a sequence of highly contrasting expressions. Moreover, these results were obtained whether the preceding sequence of expressions was shown by four different people or the same person shown in the final, critical photograph.

When the preceding sequence contained an expression that broke the continuity or uniformity of contrasting expressions that came before the final expression (such as surprise alternating with happy before a final expression of sad, or surprise alternating with sad before a final expression of happy), the results were mixed. With a final sad expression, the mixed sequences did not significantly enhance intensity ratings relative to an all sad sequence even though happy expressions constituted half of the preceding sequence. With a final happy expression however, the mixed sequence of sad and surprised did significantly enhance intensity ratings relative to an all happy sequence. Why there was a difference in the impact of preceding mixed sequences on intensity ratings of the final happy and the final sad expressions is not clear. It is tempting to speculate about the impressions created by a final happy as opposed to a final sad expression preceded by a sequence of mixed expressions.

One possibility is that surprise may be viewed as a negative emotion, more similar in its emotional quality to sadness than happiness (e.g., Ekman and Friesen, 1975; Izard, 1977). Although the present experiment offers no systematic evidence for this assumption, some support comes from the emotion-labeling check that was used to make sure that subjects were attending to each expression and labeling it accurately. In a number of cases subjects described the surprise expression as "shocked", "fear", "petrified", "scared", "disturbed", or "startled". Thus, when surprise was alternated in a mixed sequence with sad before a final happy expression, the cumulative impact of this preceding sequence

would be negative and would contrast strongly with a final happy expression. The net result would be higher intensity ratings for the final happy expression in this sequence relative to a sequence of all happy expressions.

What happens however when surprise is mixed with a happy expression in a sequence preceding a final sad expression? The presence of surprise, a negative emotional expression, would weaken the cumulative contrast with the final sad expression created by the happy expressions in the sequence. The net result would be a reduction in the difference in intensity ratings between this condition and a sequence that contained all sad expressions.

The present results may be viewed from the perspective of adaptation-level theory (Helson, 1964). Simply put, the sequence of facial expressions preceding a critically different expression may function to create an adaptation level that operates as the current standard against which new expressions are judged. Judgments of the intensity of new and qualitatively different facial expressions (emotions) are then made in comparison to the adaptation level that has been experimentally (or in other circumstances, naturally) induced by the preceding series of expressions. This apparently occurs whether the prior sequence of expressions is shown by the same person or different people relative to the person shown displaying the final, critical expression.

Research on the identification of emotion from facial expression typically involves judgments about a series of expressions which are nevertheless interpreted by the investigators as separate judgments of separate stimuli (e.g., Ekman, Friesen, & Ellsworth, 1972). The present results however suggest that there might be variable and unwitting effects on judgments of later expressions depending upon the sequence of preceding expressions.

If we extend the line of this research outside of the laboratory into clinical judgment situations for example, these results also suggest a beginning

orientation or focus toward the appreciation and explication of how the sequence of expressive behaviors seen by a judge may influence the impression or diagnostic assessment of an individual that is based, in part at least, on the sequence of expressive displays produced by the person being judged or other individuals whose preceding displays may serve as judgmental anchors.

More generally, these results may also be relevant to research dealing with cross-cultural judgments of emotion. Different cultures and subcultures may not only have different "display rules" (Ekman & Friesen, 1969), but there may also be differential significance attached by different cultures to sequences of emotional displays.

The results of this study also raise a number of questions about how an earlier sequence of expressions may influence judgments of subsequent expressions. The first question is whether the contrast effect would depend upon different dimensions of similarity in the characteristics of the individuals who display the emotionally-expressive behavior in the sequence preceding a final expressive display. The present study suggests that apparent ethnic identity and sex does not play a major role, since the contrast effect was obtained whether the target person was shown or other people (of different sexes and ethnic features) were shown in the preceding sequence. Would the contrast effect be more or less powerful depending upon systematically manipulated differences in similarity between the individual or individuals shown in the sequence preceding a final expressive display and the characteristics of the individual who showed the final display?

Another question has to do with the period of time that a contrast or enhancement effect might endure. Certainly, people do not carry around a set or anchor effect for an indefinite period of time. In the present experimental procedure the final expressive display followed quite closely in time the

presentation of the preceding four displays (approximately one minute). How enduring an experimentally-induced or naturally-induced set might be is an open question. Would it last for the same period of time if there were different intervals of time and/or different activities that came between the earlier sequence and the final display?

A related question has to do with how the exposure time of the preceding sequence of expressive displays might influence judgments of a final expression. In other words, would there be a more intense contrast effect if each of the expressive displays in a preceding sequence was shown for a relatively longer period of time? And what might be the upper limits of these exposure durations? Would viewing a sequence of displays in which each expression was seen for 30 seconds be more powerful in its contrast effect than a sequence in which each expression was seen for only 15 seconds?

Another question is whether the contrast effect found in the present study is restricted to emotional information gathered in the same context. All of the expressions that were used in the present study were presented without any information about the context or setting within which these expressions were produced. Our judges might have logically assumed that all of the expressions in a sequence were produced in the same context. What would happen if a judge saw a sequence of emotional expressions, some or all of which were produced in different contexts? Would the contrast effect still operate to enhance intensity ratings of final expressions, or would information about the context of the different expressions break this effect so that a set or adaptation level would not be created?

A final question is whether the contrast effect would appear, not only with different individuals displaying facial expressions, but within other communication channels or between different communication channels. That is, would

affective information communicated vocally, or through postures or gestures be able to create similar contrast sequences? And might a sequence of gestures, for example, influence judgments about a final facial expression? Keep in mind that behind these questions about the generalizability of this effect between channels, is evidence that the face in particular has been identified as the primary signalling site of emotion, even though posture, gesture, and movement have been identified as signalling information about the intensity of an emotion (e.g., Ekman, Friesen, and Ellsworth, 1972).

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Table 1
Facial Expression Sequences

Sequences that end in sad			Sequences that end in happy		
Code	n	Sequence	Code	n	Sequence
1	40	S ₃₇ S ₃₇ S ₃₇ S ₃₇	9	50	H ₃₆ H ₃₆ H ₃₆ H ₃₆
2	10	H ₃₆ Su ₁ H ₃₆ Su ₁ ^e	10	40	S ₃₇ S ₃₇ S ₃₇ S ₃₇
3		Su ₁ H ₃₆ Su ₁ H ₃₆	11	10	S ₄₄ S ₄₀ S ₄₂ S ₄₃
4	10	S ₃₇ H ₃₆ S ₃₇ H ₃₆	12		S ₄₄ S ₄₃ S ₄₂ S ₄₀
5		H ₃₆ S ₃₇ H ₃₆ S ₃₇	13	10	H ₃₀ H ₃₄ H ₃₂ H ₃₃
6	10	H ₃₀ H ₃₄ H ₃₂ H ₃₃	14		H ₃₂ H ₃₃ H ₃₀ H ₃₄
7		H ₃₂ H ₃₃ H ₃₀ H ₃₄	15	10	S ₃₇ Su ₁ S ₃₇ Su ₁
8	30	H ₃₆ H ₃₆ H ₃₆ H ₃₆	16		Su ₁ S ₃₇ Su ₁ S ₃₇
			17	10	H ₃₆ S ₃₇ H ₃₆ S ₃₇
			18		S ₃₇ H ₃₆ S ₃₇ H ₃₆

Note. Expression photographs and identifying subscript numbers are from Ekman and Friesen (1975), Appendix II, Pp. 173-202.

^aH = happy; S = sad; Su = surprise.

^bThe final expression in every end-in-sad sequence was S₃₇.

^cThe final expression in every end-in-happy sequence was H₃₆.

^dTwo order variations of S S S S S, with different individuals showing the sad expression, were omitted due to testing errors.

^eBracketed sequences indicate the same expressions in two different orders.

Table 2

Means and Standard Deviations of Intensity Ratings of Expression

Sequences Ending in Happy and Ending in Sad^a

End in sad				End in happy			
Code	Sequence	<u>M</u>	<u>SD</u>	Code	Sequence	<u>M</u>	<u>SD</u>
1	S ₁ S ₁ S ₁ S ₁	6.35	2.15	9	H ₁ H ₁ H ₁ H ₁	7.92	2.28
2	H ₁ Su ₁ H ₁ Su ₁	7.80	2.46	10	S ₁ S ₁ S ₁ S ₁	9.18	2.04
3	Su ₁ H ₁ Su ₁ H ₁	8.00	2.87	11	S ₁ S ₂ S ₃ S ₄	8.20	3.16
4	S ₁ H ₁ S ₁ H ₁	8.40	2.41	12	S ₁ S ₄ S ₃ S ₂	9.70	1.77
5	H ₁ S ₁ H ₁ S ₁	5.30	2.63	13	H ₁ H ₂ H ₃ H ₄	8.50	1.35
6	H ₁ H ₂ H ₃ H ₄	8.60	2.19	14	H ₃ H ₄ H ₁ H ₂	7.10	2.77
7	H ₃ H ₄ H ₁ H ₂	8.80	3.05	15	S ₁ Su ₁ S ₁ Su ₁	9.60	1.17
8	H ₁ H ₁ H ₁ H ₁	8.03	2.89	16	Su ₁ S ₁ Su ₁ S ₁	9.60	1.08
				17	H ₁ S ₁ H ₁ S ₁	8.90	1.79
				18	S ₁ H ₁ S ₁ H ₁	9.40	1.50

Note. Expressions with the same subscript in a sequence indicate that the same individual showed those emotions. Expressions with different subscripts in a sequence indicate that different individuals showed those emotions.

^aH = happy; S = sad; Su = surprise.

Table 3

Duncan's Test Results of Significant Differences Between Sequences^a

Code	End-in-sad sequences	Code	End-in-happy sequences
5	H ₁ S ₁ H ₁ S ₁ ^b	14	H ₃ H ₄ H ₁ H ₂
2	H ₁ Su ₁ H ₁ Su ₁	10	S ₁ S ₁ S ₁ S ₁
3	Su ₁ H ₁ Su ₁ H ₁	12	S ₁ S ₄ S ₃ S ₂
4	S ₁ H ₁ S ₁ H ₁	15	S ₁ Su ₁ S ₁ Su ₁
6	H ₁ H ₂ H ₃ H ₄	16	Su ₁ S ₁ Su ₁ S ₁
7	H ₃ H ₄ H ₁ H ₂	18	S ₁ H ₁ S ₁ H ₁
8	H ₁ H ₁ H ₁ H ₁	9	H ₁ H ₁ H ₁ H ₁
1	S ₁ S ₁ S ₁ S ₁	12	S ₁ S ₄ S ₃ S ₂
4	S ₁ H ₁ S ₁ H ₁	15	S ₁ Su ₁ S ₁ Su ₁
6	H ₁ H ₂ H ₃ H ₄	16	Su ₁ S ₁ Su ₁ S ₁
7	H ₃ H ₄ H ₁ H ₂		
8	H ₁ H ₁ H ₁ H ₁		

Note. $p < .05$ for all tabled comparisons.

^aExpressions with the same subscript in a sequence indicate that the same individual showed those emotions. Expressions with different subscripts in a sequence indicate that different individuals showed those emotions.

^bIndented sequences were significantly different than the sequence immediately above them.